

Appl. No. 10/542,136
Amdt. Dated March 27, 2006
Reply to Office Action of December 27, 2005

REMARKS

The drawings have been objected to because none of the boxes in Figs. 1, 4 and 5 have labels. Informal corrected drawing sheets 1, 3 and 4 are submitted herewith. It is submitted that the amendments to Figs. 1, 4 and 5 place the drawings in compliance with 37 CFR 1.121(d).

The Action cites several objections to the specification of the subject application. Amendments to the specification are presented in the section titled Amendment to the Specification. Amendments to the specification were made solely to correct grammatical errors. The amendments were not made to address issues of patentability. No new matter has been added by the amendments. Applicant respectfully submits that the submitted amendments overcome the cited objections to the specification and requests that the objections be withdrawn.

Claims 1 to 11 are currently pending in the present application. Claims 5, 7, 8 and 11 are amended for purposes of form. The amendments were not made to address issues of patentability. The amendments are supported by the application as originally filed. Therefore no new matter has been added by the amendments. Reconsideration of the present application, as amended, is respectfully requested.

Claims 1, 2, 3 and 9 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,138,319 to Tesch (hereinafter "Tesch"). Applicant respectfully submits that Tesch does not expressly or inherently disclose all of the elements set forth in independent claim 1. Thus, Tesch does not anticipate claim 1 or claims 2 and 3, which depend therefrom or claim 9.

It is an object of the present invention to obviate or at least to mitigate disadvantages of known analog-to-digital converters wherein each of the parallel conversion channels require accuracy for obtaining the desired resolution of the digital

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output signal, while further specific autocalibration means are required and a relatively high energy consumption is obtained. Thus, the present invention provides an analog-to-digital conversion arrangement, which is less complicated, and in which circuit blocks are shared in order to save energy and chip area, while mismatch problems are prevented or minimized.

Accordingly, claim 1 is directed to an analog-to-digital conversion arrangement for converting an analog input signal into a digital output signal with a most significant part and a least significant part, comprising sample means for sampling the analog input signal, a plurality of coarse resolution analog-to-digital converters for converting the sampled analog input signal into a coarse digital signal representing the most significant part of the digital output signal, whereby the coarse resolution analog-to-digital converters are operated in an interleaved way, characterized in that the analog-to-digital conversion arrangement further comprises a fine resolution analog-to-digital converter for converting the sampled analog input signal into a fine digital signal representing the least significant part of the digital output signal, based upon the coarse digital signal generated by any of said coarse resolution analog-to-digital converters. Specifically, claim 1 requires that the coarse resolution analog-to-digital converters are operated in *an interleaved way* (emphasis added).

Thus, the conversion arrangement according to the invention, as claimed in claim 1, provides for a combination of interleaved coarse resolution analog-to-digital converters, all co-operating with one single fine resolution analog-to-digital converter. By forming the coarse resolution analog-to-digital converters as overranging successive approximation analog-to-digital converters, the accuracy of these converters can be lower than the accuracy required to obtain the desired resolution of the digital output signal. In this way the specifications of the coarse analog-to-digital converters may be relaxed, thereby facilitating a simplification of the design of the analog-to-digital conversion arrangement.

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Tesch fails to disclose an analog-to-digital conversion arrangement for converting an analog input signal into a digital output signal with a most significant part and a least significant part, comprising sample means for sampling the analog input signal, a plurality of coarse resolution analog-to-digital converters for converting the sampled analog input signal into a coarse digital signal representing the most significant part of the digital output signal, *whereby the coarse resolution analog-to-digital converters are operated in an interleaved way*, characterized in that the analog-to-digital conversion arrangement further comprises a fine resolution analog-to-digital converter for converting the sampled analog input signal into a fine digital signal representing the least significant part of the digital output signal, based upon the coarse digital signal generated by any of said coarse resolution analog-to-digital converters, as clearly claimed in claim 1. Rather, Tesch is directed to a means for providing an analog-to-digital converter which increases the conversion speed of a plurality of signals and uses less die area and power than prior devices. The invention disclosed by Tesch fails to disclose analog-to-digital conversion arrangement whereby the coarse resolution analog-to-digital converters are operated in an interleaved way. Accordingly, for at least this reason, independent claim 1 is clearly patentable over Tesch.

Claims 2 and 3 depend directly from claim 1 and provide further features thereto. Accordingly, claims 2 and 3 are clearly distinguishable over Tesch for at least the reasons discussed with respect to claim 1. By way of example, the embodiment disclosed in claim 2 is directed to analog-to-digital conversion arrangement wherein the coarse resolution analog-to-digital converters are successive approximation analog-to-digital converters. Claim 3 is directed to analog-to-digital conversion arrangement wherein the fine resolution analog-to-digital converter is a successive approximation analog-to-digital converter.

Claim 9 restates the apparatus limitations of claim 1 in method format. Specifically, claim 9 claims a method for converting an analog input signal into a digital output signal with a most significant part and a least significant part, comprising:

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sampling the analog input signal by sampling means; converting the sampled analog input signal into a coarse digital signal by a plurality of coarse resolution analog-to-digital converters operated in an interleaved way, the coarse digital signal representing the most significant part of the digital output signal, characterized in that the method further comprises: converting the sampled analog input signal into a fine digital signal by a fine resolution analog-to-digital converter and using the coarse digital signal generated by any of said coarse resolution analog-to-digital converters, the fine digital signal representing the least significant part of the digital output signal. Specifically, claim 9, similar to claim 1, claims a step of converting the sampled analog input signal into a coarse digital signal by a plurality of coarse resolution analog-to-digital converters operated in an interleaved way. Accordingly, claim 9 is patentable over Tesch for at least the reasons discussed with respect to claim 1.

Accordingly, the rejections under 35 U.S.C. § 102(b) of claims 1, 2, 3 and 9 should be withdrawn and claims 1, 2, 3 and 9 should be allowed.

Claim 4 stands rejected by the Action under 35 U.S.C. § 103(a) as being unpatentable over Tesch in view of U.S. Patent No. 5,689,260 to Vallancourt (hereinafter "Vallancourt"). Claims 5, 6, 7 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tesch in view of U.S. Patent No. 5,621,409 to Cotter et al. (hereinafter "Cotter"). Claims 10 and 11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tesch in view of U.S. Patent No. 6,590,518 to Taft (hereinafter "Taft").

Claims 4 to 8 depend directly or indirectly from claim 1 and, accordingly, incorporate all of the limitations of claim 1. As discussed above, Tesch fails to disclose an analog-to-digital conversion arrangement for converting an analog input signal into a digital output signal with a most significant part and a least significant part, comprising sample means for sampling the analog input signal, a plurality of coarse resolution analog-to-digital converters for converting the sampled analog input signal into a coarse

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digital signal representing the most significant part of the digital output signal, *whereby the coarse resolution analog-to-digital converters are operated in an interleaved way*, characterized in that the analog-to-digital conversion arrangement further comprises a fine resolution analog-to-digital converter for converting the sampled analog input signal into a fine digital signal representing the least significant part of the digital output signal, based upon the coarse digital signal generated by any of said coarse resolution analog-to-digital converters, as clearly claimed in claim 1. Claim 9 restates the apparatus limitations of claim 1 in method format.

Vallencourt, Cotter and Taft also fail to disclose an analog-to-digital conversion arrangement for converting an analog input signal into a digital output signal with a most significant part and a least significant part, comprising sample means for sampling the analog input signal, a plurality of coarse resolution analog-to-digital converters for converting the sampled analog input signal into a coarse digital signal representing the most significant part of the digital output signal, *whereby the coarse resolution analog-to-digital converters are operated in an interleaved way*, characterized in that the analog-to-digital conversion arrangement further comprises a fine resolution analog-to-digital converter for converting the sampled analog input signal into a fine digital signal representing the least significant part of the digital output signal, based upon the coarse digital signal generated by any of said coarse resolution analog-to-digital converters, as clearly claimed in claim 1. Thus, neither Tesch nor Vallencourt, nor Cotter nor Taft, taken either alone or in combination, teach the invention as set forth in claims 1 and 9, much less the invention set forth in claims 2 to 8 and 10 to 11, which depend from claims 1 or 9 and add further features thereto.

Accordingly, the rejections under 35 U.S.C. § 103(a) of claims 4 to 8 and 10 to 11 should be withdrawn and claims 4 to 8 and 10 to 11 should be allowed.

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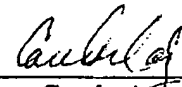
Conclusion

In view of the foregoing, Applicant respectfully submits that all claims presented in this application are currently in condition for allowance. Accordingly, Applicant respectfully requests favorable consideration and that this application be passed to allowance.

Should any changes to the claims and/or specification be deemed necessary to place the application in condition for allowance, the Examiner is respectfully requested to contact the undersigned to discuss the same.

Applicant's representative believes that this response is being filed in a timely manner. In the event that any extension and/or fee is required for the entry of this amendment the Commissioner is hereby authorized to charge said fee to Deposit Account No. 14-1270. An early and favorable action on the merits is earnestly solicited.

Respectfully submitted,

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